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ABSTRACT

This study is based on Locke's (1968) hypothesis that individuals will spontaneously set performance goals when feedback is related to a standard of performance. The study tests Locke's proposal in an actual work setting by comparing the performance rate of keystroke operators who received feedback and a standard with that of a control group who received feedback alone. Performance comparisons over a three-month period provided strong statistical support for the hypothesis. The factors that contributed to high performance levels for the subjects receiving feedback and a standard are the same as those that contribute to success in other goal-setting studies. These are: (1) goal clarity and specificity; (2) goal acceptance; and (3) regular feedback on goal progress. (Author)

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# THE EFFECTS OF FEEDBACK AND AN IMPLIED STANDARD ON WORK PERFORMANCE

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# THE EFFECTS OF FEEDBACK AND AN IMPLIED STANDARD ON WORK PERFORMANCE

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Locke (1968) hypothesized that individuals will spontaneously set performance goals when their feedback is related to a standard of performance. This proposal was tested in an actual work setting by comparing the performance rate of keystroke operators who received feedback and a standard with that of a control group who received feedback alone. Performance comparisons over a 3-month period provided strong statistical support for the hypothesis. The outcome is discussed in terms of goal theory and the use of work standards to improve productivity.

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## FOREWORD

This research was performed in support of Exploratory Development Task Area ZF55.521.018 (Organizational Management). The work reported here is part of a larger effort to determine the impact of motivational variables upon individual and unit performance and productivity. The outcome of the research reported here is generally applicable to the enhancement of productivity in a wide variety of settings; however, its greatest applicability can be expected in areas where overall productivity is dependent upon the efforts of the individual worker who is capable of setting his or her own pace.

Appreciation is expressed to Mr. Thomas Trent for his assistance in the compilation and maintenance of the data during the course of this study, and to the management and employees of the Data Processing Office of the Long Beach Naval Shipyard for their participation in and commitment to the research project.

J. J. CLARKIN
Commanding Officer

## SUMMARY

### Problem

Managers and personnel researchers have long been concerned with identifying motivational factors that result in more productive work performance. Recently, however, the demand for increased productivity has intensified because of the rapid escalation in costs associated with both personnel and materials.

### Objective

A particularly fruitful approach to the problem of motivating workers to achieve higher productivity is that of goal setting. One method by which goals can be clearly specified is through the use of performance standards. It was the purpose of this research to test a postulate of goal theory that states that an individual will spontaneously set a performance goal if he receives feedback that relates his performance to such a standard.

### Approach

Two groups of keypunch operators were observed to examine the effects of a standard on goal setting and performance. The first group of operators received weekly feedback on keystroke rate. The second group received feedback as well as a performance standard for the same work. Keystroke performance was observed for both groups for a period of 3 months.

### Findings

The group of operators receiving both feedback and a performance standard made rapid increases in keystroke rate and was found to be superior to the group receiving only feedback during the entire course of the study.

### Conclusions

The factors that contributed to high performance levels for the subjects receiving feedback and a standard are the same as those that contribute to success in other goal-setting and related (e.g., Management by Objectives) studies. These are: (1) goal clarity and specificity, (2) goal acceptance, and (3) regular feedback on goal progress.

### Recommendations

Formal programs of work standards should be used within a Management by Objectives framework to contribute to the overall organizational goals of effectiveness and efficiency. It must be emphasized, however, that positive results cannot be expected unless full attention is given to the factors of specificity, acceptance, and feedback.

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# INTRODUCTION

## Problem

Managers and personnel researchers have long been concerned with identifying motivational factors that result in more productive work performance. Recently, however, the demand for increased productivity has intensified because of the escalation in costs associated with both personnel and materials. A total approach to the problem of increased productivity should include not only the question of work motivation but also the selection process, training methods, and increases in efficiency through better work methods. The present paper focuses only on work motivation, but it should be understood that performance on the job and motivation itself are intimately related to these latter concerns as well.

## Background

There has been a wide variety of theoretical approaches to work motivation. The two-factor theory (Herzberg, 1966) emphasizes the effect that job satisfaction has on the performance of individuals. The equity theory (Adams, 1965; Pritchard, 1969) says that individuals are motivated to work by comparing their effort-reward ratio with that of their peers. The expectancy theory (Nebeker & Moy, 1976; Porter & Lawler, 1968; Vroom, 1964) points out the importance of the value of the reward offered for a given performance. Associated with each of these theoretical approaches is a variety of techniques that have been used to diagnose or to measure motivational levels in an effort to better understand the role that motivation plays in determining productive performance. To date, very few of these techniques have been extensively used to motivate workers on the job.

The technique that is most often reported in the research literature and that has been broadly applied in organizational settings is goal setting (Carroll & Tosi, 1973; Latham & Yukl, 1975), which emphasizes the important effect that conscious goals have upon an individual's productive performance. Simply stated, when difficult (but attainable) goals are set for a person, he will perform at a higher level than when goals are easier or are not clearly specified. A substantial body of research literature based upon both laboratory and field studies has resulted in two firmly established findings related to the effectiveness of goal setting:

1. Hard goals produce a higher level of performance than do easy goals.

2. Specific hard goals exert a greater influence on productivity than do nonspecific goals such as "do your best."

Goal setting has also been invoked to account for the findings of other studies of human performance. For instance, Locke (1968) has indicated that goal setting mediates the effects of extrinsic sources such as performance feedback (knowledge of results) and the use of incentives. This is to say that feedback and incentives effect performance by impelling the individual to set conscious goals (Locke, Cartledge, & Knerr, 1970). However, very little empirical work has been done to compare the effects of feedback with

those of explicit goal setting. Of course, such a comparison is fraught with the problems associated with the use of findings that support the null hypothesis; that is, if both groups increased in performance but were not different statistically, it would be difficult to determine whether or not the feedback group had set goals. According to goal theory, increases in performance under such conditions are due to implicit goal setting. However, if the performance of the feedback plus explicit goal setting group was superior, then one could conclude that goal setting exerts an influence in addition to that of feedback alone.

Taking this situation one step further, Locke (1968) has stated that "giving scores in relation to a standard is one means of implicitly manipulating or encouraging goal setting by a subject" (p. 181). This statement does not seem to have been tested and presented in the research or applied literatures, although its implications would seem to have great potential from a practical standpoint: First, it would greatly simplify the process associated with formal goal-setting procedures in many situations by providing both impetus and direction to behavior in a single feedback loop. This is to say that feedback coupled to a standard provides (1) a model for job performance and (2) information concerning the discrepancy between personal performance and the standard. Second, the jobs within business and industry for which objective performance standards have been established are legion and are continuing to grow. If the effects of implicit goal setting are at all like those of explicit goal setting, then many work situations could benefit from such a feedback loop.

## Purpose

Although goal setting has been particularly effective in motivating workers to achieve higher levels of performance (for a review, see Latham & Yukl, 1975), goal theory is often criticized because of the difficulty managers have in clearly specifying goals. One way to lessen this difficulty is through the use of work standards. Thus, the purpose of the research described here was to test a postulate of goal theory that states that an individual will spontaneously set a performance goal (i.e., engage in implicit goal setting) if he receives feedback that relates his performance to that of a standard (Locke, 1968; Locke, Cartledge, & Koeppel, 1968). The obvious advantages of a positive finding are that the procedure (1) is much simpler, (2) is more general in its application, and (3) requires a minimum of administrative time relative to other goal-setting procedures (e.g., a motivational approach based on Management by Objectives).

## APPROACH

### Research Hypothesis

The implicit goal-setting hypothesis tested here is that workers who receive both feedback and a performance standard will perform at higher levels than will those who receive feedback alone. What follows is a description of the research designed to test the hypothesis, a discussion of the generalizability of the research outcome, and some possible links between goal setting and other methodological approaches to performance enhancement.

### Sample and Experimental Design

Twenty-five female keypunch operators from the Management Information Center of the Long Beach Naval Shipyard were used as subjects. The sample was drawn from 30 such operators (including first-level supervisors) who were equally distributed across three daily shifts. The third-shift supervisor and four trainee operators were excluded from the sample prior to the beginning of the experimental manipulations due to the lack of sufficient baseline information with which to evaluate their subsequent performance. All operators included in the study had a minimum of 9 months experience on the machine and were considered by management as fully trained.

The 25 operators in the sample were distributed as follows: first shift, 10; second shift, 10; and third shift, 5. The original experimental design called for one group to receive performance feedback and a standard; a second group, feedback but no standard; and a control group, no feedback at all. A number of factors indicated that this ideal division would be difficult to achieve--the most important of which was the inability to establish such a control condition. Information concerning keypunch performance was routinely available to operators on an informal basis each day, and to keep this information from some while supplying it to others would have introduced a conflict into the workplace that would have been difficult to reconcile. Thus, the experimental design was altered to permit only one comparison, i.e., feedback plus a standard with feedback alone.

A second design problem was related to the question of which subjects would be assigned to which experimental conditions. Ideally, the requirements for an unambiguous statistical test of the hypothesis require that the operators be assigned at random to the experimental groups. However, it would have been difficult to provide different kinds of feedback to operators working the same shift, and attempts to do so would soon have been compromised by the social communications that normally occur under such conditions. It was decided, therefore, that each experimental group would consist of operators from the same shift. This decision was made with full recognition of the difficulties associated with the statistical determination of the differences between intact groups. However, a preliminary analysis of performance records available prior to the introduction of the experimental variables revealed no statistically significant differences between the groups.

Management indicated that there was more social communication between the first and third shifts than between the second and third. For this reason, it was decided to combine the first and third shifts to form one group (N = 15) and to use the second shift for the remaining condition (N = 10). The decision regarding which experimental conditions would be applied to a particular group was made by the flip of a coin. The resulting experimental groups were to be treated as follows: the combined first and third shifts would receive individual feedback only (IFO), while operators in the second shift would receive feedback plus the standard (FPS).

Task

Keypunching operations are relatively straightforward and well understood. However, two major sources of individual differences contributed to within-group variability for the sample considered here. First, ability to perform the task varied considerably across operators even though they all possessed sufficient training and experience in the tasks performed. Differences in keystroke rate appeared to be equally distributed across both groups, and statistical comparisons revealed no differences between them.

The second major difference had to do with the particular jobs performed on the three shifts. At the time of the study, the operators performed more than 200 different jobs or procedures. The range in keystroke rate in performing these jobs could be several thousand keystrokes per hour (KS/HR) for the variety of procedures performed by an individual operator (cf. Shumate, Dockstader, & Nebeker, in preparation). Again, however, the variability in procedures performed within each shift was such that the between-group differences were not statistically significant.

Procedure

The dependent measure was keystroke rate (KS/HR), which was computed as a part of several statistics that described the performance of each operator. This statistic was also used to achieve the feedback and goal setting manipulations and was calculated by determining, for each operator, the total number of keystrokes for the 8-hour shift and dividing that number by the number of minutes worked during the shift. The resulting figure was then divided by 60 to yield the hourly rate.[1] The resulting daily figures were added over the work week and divided by the number of working days in the week. The subjects in the individual feedback only (IFO) group were given this measure on a weekly basis during the week following the work performed.

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[1]The number of minutes worked by an operator during a shift rarely exceeded 240; frequently, an individual operator might not be assigned to a machine for more than a few minutes a day. Thus, to avoid the effects that short bursts of speed could have on the performance measure, keystroke performance was only recorded when the time for an individual operator exceeded 30 minutes per day.

The subjects in the feedback-plus-standard (FPS) group were also provided with their weekly average in addition to the average performance of all 25 operators.[2]

Feedback was always provided privately to avoid the possible complications associated with peer competition, which may have unanticipated effects (Dockstader, 1975; Steers & Porter, 1974). Supervisory and management personnel were not provided with this information because of the possible influences that any resultant praise or reproof might have had on their performance (Locke, 1968).

[2]Because of the skew in the distribution of this measure, the overall average was above the median performance level. However, in terms of difficulty, this "standard" was relatively easy, within the performance capability of most of the operators, and viewed as attainable by all but one of them.

## RESULTS

The dependent measure, KS/HR, was available for the 3 months immediately prior to implementation of the feedback loop. Data from this period served as a baseline against which to analyze the effects of the feedback manipulation. Descriptive statistics for the IFO group and the FPS group are provided in Table 1. The missing observations at various points in the data matrix were estimated using the multiple regression technique described by Ward and Jennings (1973). The values of the descriptive statistics using the estimated vectors are presented in Table 2.

Table 1

Descriptive Statistics of Keystroke Rate Prior to and Following Implementation of a Feedback Loop

| | Months | | | | | |
|---|---|---|---|---|---|---|
| | Prior to Feedback | | | Feedback Period | | |
| Group | 1 | 2 | 3 | 4 | 5 | 6 |
| Ind. Feedback Only (IFO) | | | | | | |
| Mean | 8834 | 8733 | 8055 | 7250 | 8015 | 8175 |
| Standard Deviation | 3060 | 2654 | 2517 | 2266 | 2374 | 2621 |
| Number of Observations | 10 | 14 | 14 | 13 | 13 | 13 |
| Feedback Plus Standard (FPS) | | | | | | |
| Mean | 8402 | 8204 | 7822 | 8839 | 9753 | 10297 |
| Standard Deviation | 2338 | 2877 | 1959 | 2328 | 2205 | 2514 |
| Number of Observations | 09 | 08 | 09 | 10 | 10 | 08 |

Table 2

Estimated Monthly Average
Keystroke Rates for Feedback Groups

| Group | Months | | | | | |
|---|---|---|---|---|---|---|
| | Prior to Feedback | | | Feedback Period | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Ind. Feedback Only (IFO) | | | | | | |
| Mean | 8130 | 8691 | 7852 | 7225 | 7863 | 8110 |
| Standard Deviation | 2704 | 2563 | 2395 | 2186 | 2362 | 2538 |
| Feedback Plus Standard (FPS) | | | | | | |
| Mean | 8262 | 8248 | 7701 | 8839 | 9753 | 9603 |
| Standard Deviation | 2249 | 2590 | 1886 | 2328 | 2205 | 2798 |

Univariate analysis of variance procedures can be used to analyze data derived from repeated observations of the same subject when the assumption of independence for the within-subject effects can be satisfied (Scheffe, 1959). To determine whether this condition had been met, a test of the equality and symmetry of the variance-covariance matrices was performed (Kirk, 1969). The assumption of equality (homogeneity of variance and covariance) was found tenable ($\chi^2(6) = 7.43$, $p > .10$) as was symmetry ($\chi^2(4) = 3.87$, $p > .10$). Thus, the means of Table 2 were subjected to the analysis of covariance with one between-subjects factor, feedback condition, and with one within-subjects factor, months of performance. The covariate used was the performance mean for the month immediately prior to implementation of the feedback conditions. The relationship between the covariate and the dependent measures was linear ($F(2,24) = 37.46$, $p < .01$) and the within-group regression coefficients were homogeneous ($F(2,21) = 1.37$, $p > 10$). The value of beta, the pooled regression coefficient, was .899. The covariate mean and the adjusted means for the feedback period are displayed in Figure 1.

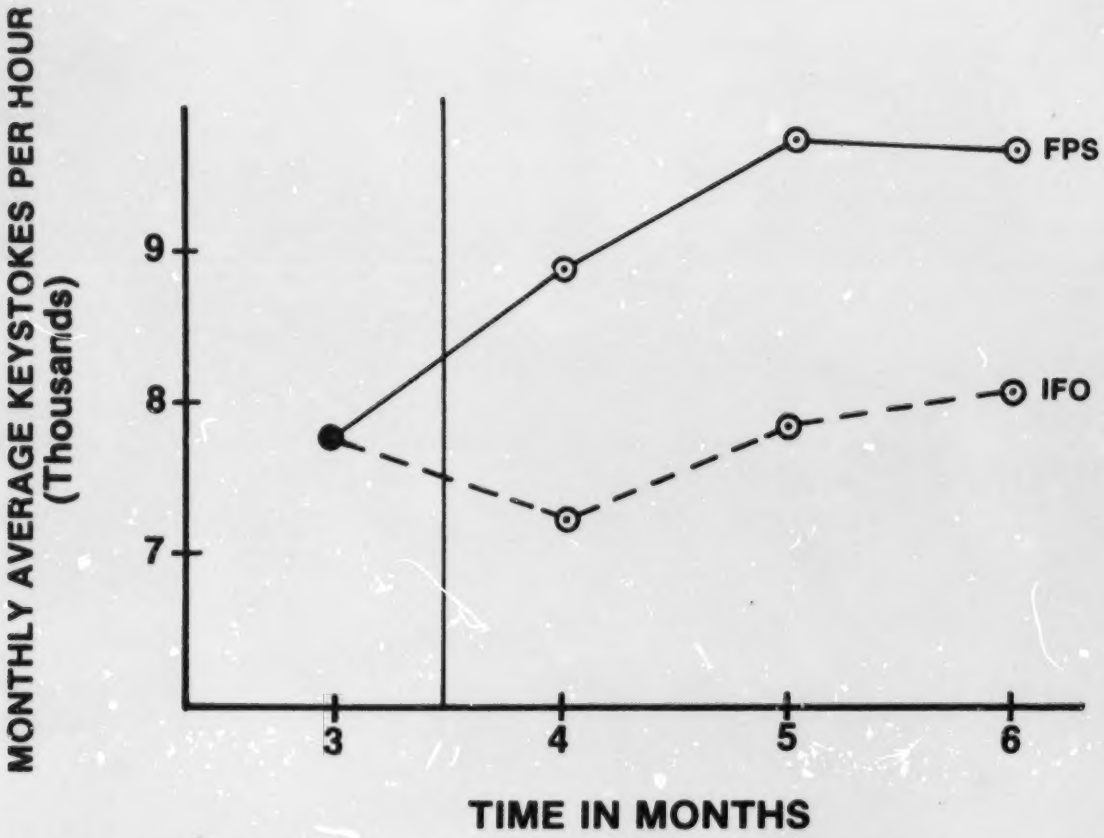


Figure 1. Covariate mean and adjusted monthly performance averages for the Feedback Plus Standard (FPS) and Individual Feedback Only (IFO) groups.

The analysis of covariance revealed a significant effect for the differences between the feedback groups ($F(1,22) = 12.51$, $p < .01$). Figure 1 shows that subjects in the IFO condition were clearly inferior in their performance to those in the implicit goal-setting condition (FPS). The repeated measure, months of performance, was also significant ($F(2,41 = 12.71$, $p < .01$), indicating an overall increase in performance during the feedback phase. The lack of a significant interaction ($F(2,41) = .61$, $p > .01$) could indicate, among other things, that the differences between the two groups was consistent across trials. Such a consistency suggests that there could possibly be an effect due to feedback in the IFO condition; that is, that feedback itself resulted in increases in performance. This is evidenced to some extent in the adjusted means of Figure 1.

## DISCUSSION

The findings support Locke's contention that feedback presented along with a standard will result in higher levels of performance, presumably due to the influence of the standard on goal setting. It should be pointed out, however, that the study did not compare the effects of implicit goal setting with a condition in which goals were set in the more usual manner; that is, explicitly. As such, it is impossible to determine whether the effects found here are similar to those conducted in the more typical manner (cf. Locke et al., 1968) or are, in fact, due to the same mechanism.

A second consideration related to the mechanism involved in implicit goal setting has to do with the role of the standard. In more conventional studies of goal setting, the goal usually has been some percentage increase in performance over a previous trial or practice condition. In the present study, the performance standard may have been viewed by some subjects as a goal itself--but most of the subjects in the FPS condition soon exceeded the standard. Thus, the standard only provided information concerning a subject's performance relative to that of the "average operator." Clearly, in the present experiment, the standard in and of itself was not the goal. Relational feedback, however, does not invariably result in superior performance when compared with other forms of feedback (Nebeker, Dockstader, & Vickers, 1975).

The present study, while not critical from the standpoint of goal theory, is of considerable importance with regard to the potential application of the findings. This is primarily due to the fact that the goal-setting manipulations were achieved by the simple addition of one information element--a performance standard--to an existing feedback loop. If, in fact, performance goals are implicitly set in response to feedback that contains a standard, then it would greatly simplify goal-setting procedures that are carried out in connection with Management by Objectives (MBO) programs.

The implementation of goal-setting procedures is very often more difficult than is apparent from the methodology used here. Thus, prior to a discussion of the use of implicit goal setting and work standards in an MBO framework, it is necessary to examine the generalizability of the present findings to the other variables that have been shown to be related to the effectiveness of goal setting. It is further assumed that the success of these experimental findings can be translated in some meaningful way to similarly successful applications when the factors identified in the research literature are systematically considered.

### Task-Goal Factors

One of the primary factors that was critical to the success of the present study and that is important in the application of these findings is the acceptability of the performance measure. From an experimental standpoint, the use of keystroke rate (KS/HR) provided a widely accepted indicator of motivational effects. From a practical standpoint, it was useful because the performing individuals recognized it as a valid and generally accepted indicator

of performance for their job. It is important that feedback loops be constructed around accepted job criteria that have recognized validity for those performing the task, rather than some vague criteria that often leave the worker with the feeling that supervisors and managers judge their performance with criteria that are capricious, arbitrary, or irrelevant.

A second factor that facilitates performance in a goal-setting situation is that of goal clarity or specificity. This refers to how explicitly the task goal is stated for the employee. All other things being equal, the more explicit the goal, the higher the likelihood that it will be attained (Steers & Porter, 1974). The general consensus in the research literature is that specific goals can serve to focus attention and effort, clarifying what is to be achieved and leading to improved task performance. This requirement was met in the present study by the use of a standard that was derived from the performance of individuals working at the task. The operators in both conditions clearly understood its significance, its derivation, and its relationship to their own performance.

The third (and most critical) factor is goal acceptance. As was pointed out in the Introduction, harder goals result in higher performance as long as they are seen to be attainable. Whether a goal is perceived as attainable or as in the "zone of impossibility" (Steers & Porter, 1974, p. 442) can be ascertained through interviewing a representative sample of employees. The basic idea is that an individual will not strive for a goal if he perceives that it exceeds his ability. In MBO settings the acceptance of difficult goals is often facilitated by giving the participants varying degrees of control in setting the goals (Carroll & Tosi, 1973). MBO's proponents say that such participation not only results in realistic and attainable goals but also increases participants' long-term commitment to them. It should also be pointed out that the validity of the performance measure and its specificity also influence the acceptability of the goal. If a goal requires a person to be evaluated in ways unfamiliar to him or if it is not clearly stated, then he is much less likely to accept it as attainable.

Importance of Feedback

Although feedback is usually considered in the cluster of task-goal attributes discussed above (cf. Steers & Porter, 1974), there are several facets to its use that have particular implications for the present experiment; these will be presented here in detail. Feedback loops in situations such as this experiment function in a servo-cybernetic manner that provides the operating system (human in this case) with necessary operating information. In the goal-setting situation, this information results in three important manifestations: (1) it makes the individual aware of his level of performance, (2) it provides information relative to the proximity to the goal (goal progress), and (3) it sustains performance at elevated levels for longer periods.

The first function of feedback--awareness of the level of performance--is something that is very often taken for granted by managers and employees alike. In the present experiment, it was found that more than 50 percent of the operators did not give accurate reports concerning their keystroke rate prior

to implementation of the feedback loop. This was considered noteworthy by both the experimenters and management because the information is regularly available to the operators and because the operators consider it the most valid measure of their performance. Not unexpectedly, the reports were almost invariably higher than the actual levels of performance, and those most aware of their keystroke rate were among the highest performers. The implication for goal setting is this: when an individual is not aware of his level of performance, there is no way to evaluate it against an objective (or subjective) standard for that performance, and thus there is no impetus to change.

The second function of feedback in goal-setting situations is to provide information on progress toward the goal. Although this is closely related to the question of awareness of performance level, it also considers the effects of the proximity of the goal or standard as an impetus to improved performance. The failure of many employees to meet goals or to achieve standard levels of performance has very often been attributed to the lack of complete information on goal progress (Carroll & Tosi, 1973). This situation is analogous to a fixed interval schedule of reinforcement (Glaser & Klaus, 1966), in which performance increases as a function of proximity to the goal. In practical situations, however, goals very often are not met because of the lack of feedback early in the time interval specified for goal attainment. The success of subjects in the FPS condition of this experiment was due, in part, to the fact that feedback was delivered on a regular basis starting early in the attainment interval.

The third function of feedback is to sustain improved performance. The likelihood that a person would expend increased effort over an extended period simply in response to a stated goal of increased performance is small, especially in the type of work done by the subjects in the present study. Interviews after the experiment revealed that the feedback served as a prod; that is, as a continual reminder of the subjects' relationship to the goal. Although most subjects in the FPS condition were soon performing at a level above the "standard," verbal reports by these operators indicated that feedback reminded them of the challenge implicit in being compared to a standard. Goal striving and attainment in such circumstances often appeal to needs for achievement and accomplishment (Latham & Baldes, 1975; Steers & Porter, 1974). A task that lacks regular performance feedback does not provide the needed challenge.

## Goal Setting, Performance Standards, and Management by Objectives

In this study, the feedback given to the FPS group contained an easily obtained performance standard: the average performance for all operators across a variety of tasks. There are probably many jobs for which such a procedure could be expected to be successful. More often, however, standards are developed separately for each task done by a worker. This was, in fact, done for a separate phase of the work done within the keypunch section of this organization.

There are many ways to establish performance standards, most of which either use historical data to develop reliable averages for individual jobs

or standards developed by industrial engineering techniques that are based upon time and motion studies. The reliability and/or validity of a particular approach usually depend upon the amount of information available concerning the parameters that are relevant to the performance of a particular task. The successful application of standards to improve employee performance is not so much tied to the method of their derivation as to their acceptability to the work force. Factors related to acceptability are (1) the difficulty of the standard, (2) the validity of the standard across time, (3) the stability of the standard, and (4) the consequences associated with performance above or below the standard. Each of these factors has potential motivational and performance consequences and must be considered in goal-setting and MBO implementations.

The first factor, difficulty, has been discussed previously in terms of whether or not the employee views the standard as attainable. The second factor, validity across time, has to do with the changes in the technology or the methods required to perform a job. Workers very often dislike changes in standards, but such changes are very often necessitated when the requirements for producing are lessened. It is advisable under such conditions to provide an adequate justification for such changes so that workers will accept the new goals implied by the new standards.

The third important characteristic related to the successful implementation of performance standards has to do with their stability or permanence. A common apprehension among workers is that, when their collective performance rises to or above the level of the standards, the standards will be raised. Such so-called "ratchet effects" result in frustration and, almost without exception, lead to poorer performance. To avoid such difficulties, standards must be reviewed for acceptability to both workers and management prior to implementation. This procedure, similar in its important respects to participation in goal setting, is not characteristic of most programs that use standards--a result, perhaps, of the long history of union/management discord concerning the use of performance standards in setting pay and compensation. An important interim step to avoiding such difficulties could be achieved if management would make a realistic determination of satisfactory standards. Following this, industrial engineers or engineering psychologists could determine--through interviews and/or examination of historical records--whether or not the performance requirements were attainable and acceptable to the work force. Once established and implemented, the standards should be changed only if invalidated by changes in methods or technology.

The fourth aspect of standards that has implications for goal-setting programs such as MBO has to do with the consequences, other than feedback, of performance above or below standard. Performance standards are frequently used for the purpose of personnel evaluation in addition to their intended purpose of production control and accounting. The addition of the personnel evaluation function to a program of feedback and standards very often introduces some degree of threat. This, in turn, highlights all of the above considerations concerning attainability and "ratchet effects." A feedback program that, under the implicit goal-setting assumption, encourages high performance can soon become negatively evaluated because the consequences of substandard performance

may be censure or, at worst, dismissal. Again, preliminary steps that are taken to ensure that the standards are (1) reasonable, (2) accepted by the employees, and (3) not subject to capricious changes will obviate many of the potential difficulties associated with the perceived threat to job security.

The acceptability of performance standards can be greatly and usefully enhanced by linking them to a scale of progressive rewards; that is, by tying rewards to production levels. Such a program not only facilitates the acceptance of standards, but the incentive characteristics of the rewards offered for high performance can further enhance productivity (Shumate et al., in preparation). The return in productivity under such a system can (1) far outweigh the costs incurred by the use of monetary incentives and (2) provide a valuable link between organizational effectiveness (achievement of goals) and organizational efficiency (decrease in cost/benefit ratio). An example of how performance standards under incentive conditions can be used to support costs/benefits analysis and also facilitate production goals can be found in Bretton, Dockstader, Nebeker, and Shumate (in preparation).

## CONCLUSIONS

When individual performance feedback is given in conjunction with a standard for that performance, individual performance will improve. A consideration of the results of the research described here and elsewhere emphasizes the importance of clearly specifying performance goals that the worker perceives as attainable. Regular, nonevaluative feedback concerning progress toward goal attainment is necessary to sustain high levels of performance. If performance standards are the basis for goals, then it is vital that they not be revised upward unless the performance requirements that constitute goal attainment are significantly reduced.

## RECOMMENDATIONS

Performance standards should be implemented in the large variety of jobs for which they have been developed. Implementation should take place within a carefully planned program based upon the prescriptions and applications of goal theory (Carroll & Tosi, 1973; Latham & Yukl, 1975; Locke, 1968; Locke et al. 1968; Steers & Porter, 1974), with particular attention to the importance of goal attainability and to the requirements for regular and non-evaluative feedback on goal progress. Implementation of such a program could be facilitated by the use of incentives for goal attainment, an example of which is presented in Shumate et al. (in preparation). Organizational efficiency measures based upon costs/benefits analysis could also be developed around such programs to facilitate acceptance of the approach at the management level (cf. Bretton et al., in preparation).

## REFERENCES


Adams, J. S. Inequity in social exchange. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 2). New York: Academic Press, 1965.

Bretton, G. E., Dockstader, S. L., Nebeker, D. M., & Shumate, E. C. Preliminary cost/effectiveness analysis, cost-savings projections, and related issues of a performance-contingent reward system that uses economic incentives (NPRDC Rep.). San Diego: Navy Personnel Research and Development Center, in preparation.

Carroll, S. J., Jr., & Tosi, H. J., Jr. Management by objectives: Applications and research. New York: Macmillan, 1973.

Dockstader, S. L. Goal setting and performance in response to negative feedback. Proceedings of the meetings of the Western Psychological Association, Sacramento, 1975.

Glaser, R., & Klaus, D. A reinforcement analysis of group performance. Psychological Monographs, 1966, 80, (13, Whole No. 621).

Herzberg, F. Work and the nature of man. Cleveland: World Publishing, 1966.

Kirk, R. Experimental design: Procedures for the behavioral sciences. Belmont, CA: Brooks/Cole, 1969.

Latham, G. P., & Baldes, J. J. The "practical significance" of the Locke's theory of goal setting. Journal of Applied Psychology, 1975, 60, 122-124.

Latham, G. P., & Yukl, G. A review of the application of goal setting in organizations. Academy of Management Journal, 1975, 18, 824-845.

Locke, E. A. Toward a theory of task motivation and incentives. Organizational Behavior and Human Performance, 1968, 3, 157-189.

Locke, E. A., Cartledge, N., & Koeppel, J. Motivational effects of knowledge of results: A goal setting phenomenon. Psychological Bulletin, 1968, 70, 424-435.

Locke, E. A., Cartledge, N., & Kneer, C. Studies of the relationship between satisfaction, goal setting, and performance. Organizational Behavior and Human Performance, 1970, 5, 135-138.

Nebeker, D., Dockstader, S., & Vickers, R. A comparison of the effects of individual and team performance feedback upon subsequent performance (NPRDC Tech. Rep. 75-35). San Diego: Navy Personnel Research and Development Center, May 1975. (AD-A010 131)

Nebeker, D. M., & Moy, M. C. Work performance: A new approach to expectancy theory predictions (NPRDC Tech. Rep. 76TQ-47). San Diego: Navy Personnel Research and Development Center, September 1976. (AD-A030 451)

Porter, L. W., & Lawler, E. E. Managerial attitudes and performance. Homewood, IL: Dorsey, 1968.

Pritchard, R. D. Equity theory: A review and critique. Organizational Behavior and Human Performance, 1969, 4, 197-211.

Scheffe, H. The analysis of variance. New York: Wiley, 1959.

Shumate, E. C., Dockstader, S. L., & Nebeker, D. M. Effects of a performance contingent incentive system on worker productivity: A field study (NPRDC Rep.). San Diego: Navy Personnel Research and Development Center, in preparation.

Steers, R. M., & Porter, L. W. The role of task-goal attributes in employee performance. Psychological Bulletin, 1974, 81, 434-452.

Vroom, V. H. Work and motivation. New York: Wiley, 1964.

Ward, J. H., Jr., & Jennings, E. Introduction to linear models. Englewood Cliffs, NJ: Prentice-Hall, 1973.

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